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Ethanol Policy in the Clean Air - Free Trade Era

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Abstract

The U.S. corn ethanol industry is a subsidized, high cost, trade protected, limited scale industry; unable to compete in free markets or to efficiently supply new fuel demands of clean air legislation. Lower cost, sugar cane ethanol from Latin America (Brazil) should be a supplementary source, especially for U.S. coastal markets. Counter trade - corn for ethanol - would be more beneficial to U.S. corn producers than domestic ethanol corn markets. Variable producer subsidies should replace current market subsidy and import tax policies; giving limited protection to the domestic ethanol industry, while assuring adequate low cost ethanol supplies through competitive imports.

Free trade arrangements are proliferating in the Western Hemisphere and clean air legislation is changing the profile of automotive fuels, especially in the United States. These changes present unprecedented opportunities for agriculture (ethanol) to participate as a major supplier of environmentally positive automotive fuels. The U.S. ethanol industry, however, is ill prepared to take advantage of this opportunity, and protectionist polices block wider participation from lower cost ethanol producers throughout the Hemisphere.

There are many economic and policy problems affecting the market potential of the U.S. corn ethanol industry. After ten years of growth, it continues as a high cost, highly subsidized, trade protected, regionally located, and producer oriented program without a market focus. In the 1980s, the need to replace lead as an octane additive in gasoline gave ethanol its first significant market opportunity. But, petroleum refiners opted in large

measure to substitute other octane sources (principally MTBE) for lead rather than rely on small, subsidized, and uncertain long run supplies of ethanol.

A number of additional market shortcomings contributed to low acceptance of ethanol as an octane enhancer. These included: transport and storage difficulties; variable state subsidy levels; a single fixed gasoline-ethanol mixture ratio (90%-10%) to qualify for state and federal subsidies; and reluctance on the part of refiners to substitute ethanol for 10 per cent of their petroleum products. Consequently, ethanol has been used and priced chiefly as a gasoline substitute, primarily in mid-west markets. With this limited market scope and a small regional industry there has been little demand for policy correction.

Now, all this is changing. The 1990 Clean Air Act Amendment followed by a 1991 industry-government accord to produce gasolines with higher oxygen content has created a second, but greatly expanded and higher value market opportunity for fuel ethanol; especially in specific pollution non-attainment markets. Some states and cities are enacting fuel regulations that go beyond those specified in the Clean Air Act, adding further to the need for alternative fuels such as ethanol. Estimates place this new oxygenate additive demand at 3.7 billion gallons of ethanol equivalent by 1995; more than three times current ethanol use.

The clean air benefits of ethanol additives in gasoline are substantial and ethanol can compete effectively for a significant part of this new market. However, the ability of the U.S. corn based industry to supply efficiently the needed quantities of competitively priced ethanol continues to be limited. Yet, a major corn ethanol expansion effort is under way, protected by high subsidies and import taxes. And, budget costs mount.

To limit tax payer and consumer costs and to assure long run market acceptance, ethanol supplies from the much more efficient sugar cane based ethanol industries in Latin America (principally Brazil) need to be included in the policy framework. This may be politically difficult since corn producers have provided strong support for current policy including the ban on imports. But, even this support may be short sighted, since the potential benefits from counter trade in ethanol and corn far exceed the benefits to U.S. corn farmers from domestic use of corn to produce ethanol.

These new market realities signal the need to replace the infant industry, producer oriented policy arguments that prevailed in the 1980s with a more mature view of the costs and opportunities that ethanol production, trade, and use bring to the U.S. economy. Consumers (taxpayers) will clearly gain from a trade oriented ethanol policy while U.S. ethanol producers will lose. But, a modest, restructured subsidy program targeted to domestic producers would protect investments already made while allowing significant benefits of trade to be achieved in the new clean-air era.

Ethanol Production Capacity

Ethanol production capacity from corn is currently about 1.1 billion gallons per year, less than one percent of gasoline use (115 billion gallons). This capacity utilizes about 450 million bushels of corn annually. One bushel of corn produces 2.5 gallons of ethanol and 18 lbs. of distillers dried grains under a dry-milling process. Wet milling produces a different set of by-products: 1.6 lbs. of corn oil, 2.5 lbs. of corn gluten meal, 12.5 lbs. of corn gluten feed and 15-18 lbs. of carbon dioxide.

These ethanol by-products compete with soybean products in protein feed and oil markets, lessening the impact of additional corn demand on farmer income. For example, adding one billion gallons of ethanol capacity would require an additional 400 million bushels of corn, but would raise the price of corn only $0.10 per bushel (USDA).

Brazil produces 3 billion gallons of ethanol per year from sugar cane, but has capacity to produce over 4 billion gallons and therefore could be an additional supply source for the U.S market. Since sugar cane requires two years to mature, this excess Brazilian capacity would not be available to world markets for at least two years. A minor sugar cane based ethanol industry is also possible in the Caribbean.

Ethanol Production Costs

During the 1980s, costs of producing ethanol from corn ranged from $.90 to $1.50 per gallon depending on corn prices, ethanol by-product prices, and energy costs (USDA). At today's corn price of about $2.50 per bushel, average ethanol costs are $1.30 per gallon. Corn at $3.00 per bushel would raise this cost to about $1.50 per gallon. Corn at $1.50 per bushel would lower the cost to $1.00 per gallon.

Brazilian sugar cane based ethanol can be produced for $.80 per gallon and delivered to U.S. gasoline refineries for $1.00-1.10 per gallon, but a $.54 import tax and $.03 import duty bring the total U.S. market cost to about $1.60 per gallon.

Ethanol Subsidies

The federal subsidy is $.54 per gallon of ethanol. State subsidies, on average, add another $.10 for a total subsidy of about $.65 per gallon. The federal subsidy is generally applied at the blending or retail level in the form of a $.054 exemption from the federal excise tax on each gallon of ethanol-gasoline mixture sold (10% ethanol, 90% gasoline). Recently, ETBE (ethanol and isobutylene) production has been cleared for an equivalent subsidy at the refinery level. ETBE will compete with MTBE as an octane enhancer and as an oxygenate source.

State subsidies vary in amount and form and are concentrated in corn producing states. In Ohio, the state tax exemption is applied at the wholesale level directly to ethanol sales and is currently $.15 per gallon of ethanol. Thus, in Ohio, the net cost of ethanol to a gas station would be $.69 less than the market price of ethanol. For example, if ethanol sold for $1.30 per gallon, the net cost to the gas station would be $.61 per gallon ($1.30-$.69=$.61). State subsidies are gradually declining as states realize that local producers cannot capture the subsidy rents and state budgets come under increasing pressure.

A $.57 per gallon import tax-duty ($.54 tax, $.03 duty) effectively shields U.S. ethanol producers from foreign competition. The import tax offsets the federal excise tax exemption. With a cost of $1.10 per gallon of imported ethanol, the net cost of imported ethanol to Ohio gas stations would be $.98 per gallon as compared to the $.61 per gallon for domestic ethanol ($1.10+$.57-$.69=$.98).

Because of the current policy focus, 96 percent of ethanol production capacity and 70 percent of ethanol demand (1991) is located in ten midwestern states (corn belt and adjacent states). More specifically, 80 percent of ethanol production capacity is located in a small area surrounding Chicago in Northern Illinois, Eastern Iowa and Northwestern Indiana (figure 1).

Ethanol and the Clean Air Act

The Clean Air Act Amendment of 1990 changes dramatically the market and policy focus of ethanol production and use. The original Clean Air Act (1970) was focused on the automobile as a polluting agent. In the 1990 amendment, fuel is the primary focus. Over the next several years, a number of new fuels will replace traditional gasoline in over one-half of the gasoline markets. The first change is to an oxygen requirement (2.7%) in gasoline sold in about 40 metropolitan areas in the winter months starting in November of 1992. The oxygen is needed to reduce carbon monoxide (C0) emissions. This creates an immediate new oxygenate additive market demand equivalent to 1.3 billion gallons of ethanol.

A mixture of eight percent ethanol and 92 percent gasoline satisfies this new requirement. MTBE will also meet the oxygen requirement, but at double the ethanol concentration. Combinations of the two additives can be used, gaining their octane properties as well. This changes significantly the economics of gasoline refining. It also changes the reference price for ethanol from wholesale gasoline (+/- $0.65/gallon) to MTBE (+/- $1.00/gallon).

This new demand for oxygenated fuels will be generated primarily in major metropolitan areas, located principally on or near the East (35%) and West (39%) coasts; areas most easily supplied by water transport. For example, California will require one-third of the oxygenated fuel mandated for CO non-attainment areas; the eastern coastal corridor from Boston to

Washington D.C. will require a second third. This adds a $.12 to $.27 per gallon transportation cost to bring mid-west corn based ethanol to these coastal markets.

The second new fuel is a reformulated gasoline that will be required to combat ozone (smog) formation. Again, this fuel will have an oxygen component (2%), and will be mandated in nine metropolitan areas for the full year starting in 1995. As with the CO non-attainment areas, 74% of the demand will be located on the east and west coasts. Oxygenate additive demand for reformulated fuel will be equivalent to 2.4 billion gallons of ethanol. The impact of ethanol use on ozone formation is less clearly known. Thus, its role as a component in reformulated gasoline is still to be determined. By the turn of the century, even more stringent fuel specification will bring additional changes to automotive fuel markets.

Counter Trade Possibilities

As noted above, Brazil has a cost advantage in producing and marketing ethanol. They also have a current one billion gallon annual excess production capacity and the land available to make considerable sugar cane production expansion if international ethanol markets are available.

Brazil is also the world's third largest producer of corn. But, corn production in Brazil is competitive only in interior production regions. U.S. corn can be delivered to deficit coastal regions of Brazil at lower costs than

Brazil can produce and transport corn from interior producing regions. This creates a comparative advantage relationship - corn from the U.S. and ethanol from Brazil - that can form the basis for bi-lateral trade. Similar trade potential exists in the Caribbean and other Latin American countries. For farmers, trade markets are preferable to ethanol producer markets since they avoid the price depressing effects of ethanol by-product competition with soybeans.

A Suggested Policy Reform

The current federal policy (as noted above), involves an exemption from federal excise taxes at the blender and retail levels for specific ethanol uses, (a 10% ethanol - 90% gasoline mixture, and ETBE) with an offsetting import tax-duty. The net result of this narrowly focused policy is a limited ethanol supply, a high priced product that has narrowly defined uses only, and an ethanol industry with periodic booms and busts as it operates on a fixed subsidy level, but faces volatile prices for corn (cost side) and oil (revenue side).

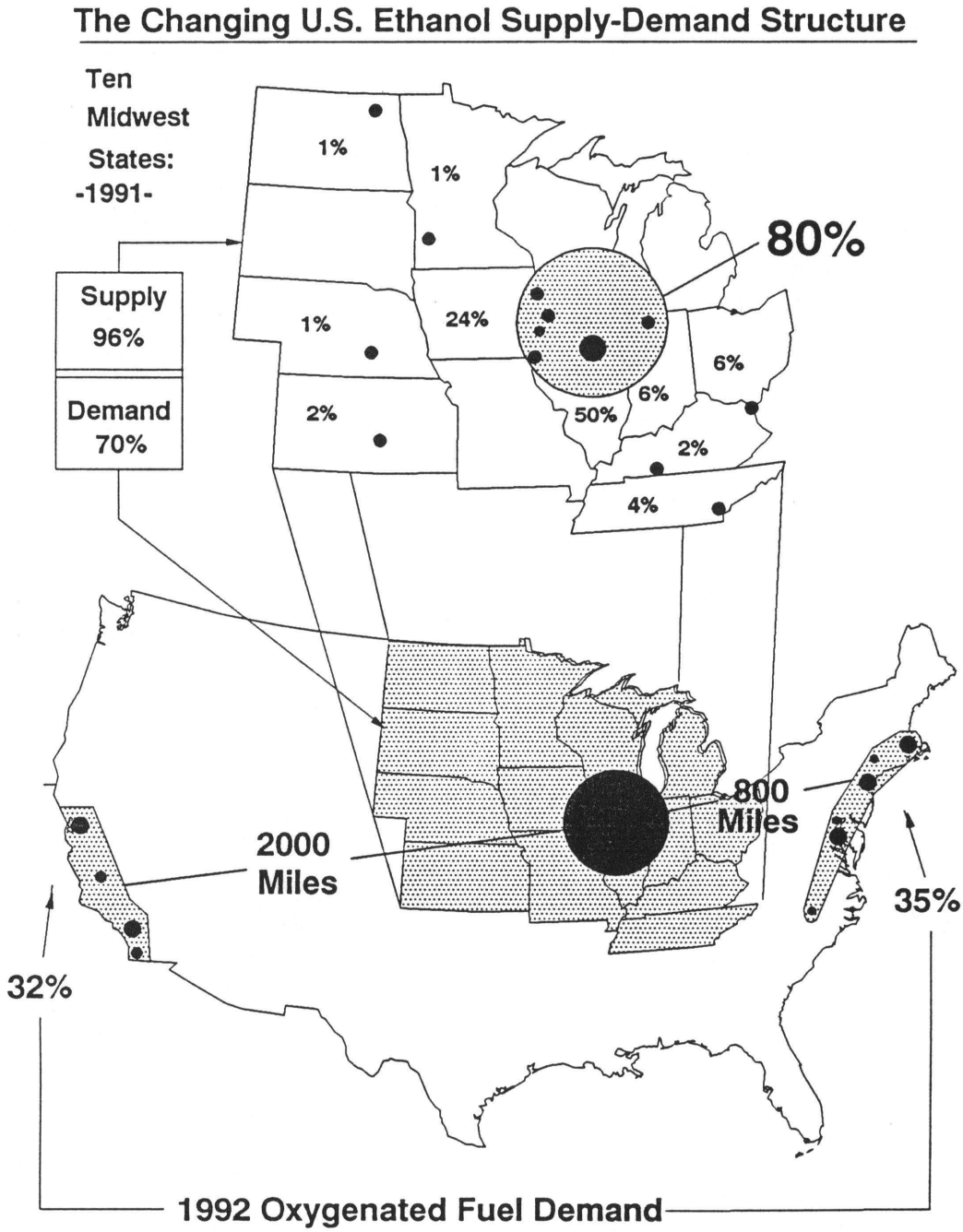
As we contemplate ethanol policy in the **Clean Air-Free Trade Era** (and assuming that we wish to maintain a minimum domestic ethanol program), a far better alternative would be a *variable ethanol subsidy paid directly to producers*. This would eliminate the current high market price for ethanol and the need for an import tax. The variable subsidy would be

determined periodically (monthly or quarterly), and would take into account average industry production costs and current corn and fuel (additive) prices, eliminating the economic uncertainty associated with wide swings in corn and fuel prices. It would also minimize treasury costs.

With a subsidy paid directly to U.S. ethanol producers, ethanol prices would find their own competitive level in the market, as ethanol is drawn automatically to it's best use. Refiners, gasoline marketers and other ethanol users, would be free to adjust to the most economic use. Imports would compete on a non-subsidized level, and add to and diversify our fuel sources.

Many important public interests (clean air, diversified energy supplies, consumer and taxpayer costs) have been lost in previous policy debates over the private interests of corn farmers, ethanol producers, and automobile and oil companies. The economics are clear. If ethanol, is produced, traded, and used in relatively free markets, it can play a major role in the clean-air era. We need to refocus public discussion on the important policy issues.

Figure 1.


The Changing U.S. Ethanol Supply-Demand Structure
Ten Midwest States: -1991-
Supply 96%
Demand 70%
1%
1%
1%
24%
80%
6%
6%
50%
2%
2%
4%
800 Miles
2000 Miles
35%
32%
1992 Oxygenated Fuel Demand